REMARKS

Claims 1-2, 4-8, 12-16, and 19-26 are pending in the present application. In the Office Action mailed July 14, 2004, the Examiner rejected claims 7-8 and 12-14 under 35 U.S.C. §112, second paragraph, as being indefinite. The Examiner next rejected claims 1-2, 4-6, 15-16, and 19-26 under 35 U.S.C. §102(e) as being anticipated by Becker et al. (USP 6,560,309). Claim 8 was rejected under 35 U.S.C. §103(a) as being unpatentable over Becker et al. in view of Hampel et al. (USP 6,298,117). The Examiner also objected to claims 2, 4, and 7 because of certain informalities.

Regarding the Examiner's objections, Applicant has amended claims 2 and 4 to refer to voltages in language consonant with claim 1. In the clause of claim 7 now reading "determine a primary data acquisition stage and a secondary data acquisition stage," the letter "s" which had previously appeared in brackets was meant to be deleted in the previous amendment. Applicant apologizes for the confusion. Thus, as claim 7 reads now, "the primary data acquisition stage" does not lack an antecedent basis. Applicant has also amended claim 13 to include the words "primary" and "data" for further clarity. Claims 1, 22, 24, and 25 have been amended to correct typographical errors.

In rejecting claim 7 under 35 U.S.C. §112, the Examiner stated that in claim 7 "on line 19, 'the imaging data' lacks proper antecedent basis, and it is unclear whether 'the imaging data' is data from the primary acquisition stage, the secondary acquisition stage or both." While Applicant believes that the meaning of claim 7 was understandable prior to the current amendments, Applicant has attempted to render the antecedent basis of "the imaging data" more apparent. As claim 7 now reads, "reconstruct an image of the scan subject from imaging data acquired during each data acquisition stage," it is plainly evident that "imaging data" refers to imaging data acquired during each of the primary acquisition stage and the secondary acquisition stage. (Emphasis added).

Claims 1-2, 4-6, 15-16, and 19-26 were rejected under 35 U.S.C. §102(e) as being anticipated by Becker et al. However, Applicant believes that Becker et al. does not teach that which is claimed and is a quintessential example of the type of art the present invention is designed to supplant. That is, Becker et al. teaches modulation of an x-ray tube current, while the present invention teaches modulation of an x-ray tube voltage.

Claim 1 unambiguously calls for modulation of x-ray tube voltage in the step of "energizing a high frequency electromagnetic energy source to a data acquisition voltage" and in the step of "energizing the high frequency electromagnetic energy source to a non-data acquisition voltage." In response to these steps, the Examiner cited column 5, lines 22-25, 45-47, and 52 to 55 of Becker et al. Column 5, lines 22-25, relates that modulation of x-ray intensity is accomplished "for example by a corresponding modulation of the tube current of the x-ray source 1." (Emphasis added). Additionally, in the section of Becker et al. entitled "Summary of the Invention," it is clear that "[t]he x-ray dose by means of the tube current is regulated with the ECG signal." Col. 3, lns. 10-12. (Emphasis added).

In the present Application, Applicant recognized a method of x-ray modulation similar to that of Becker et al., and identified several drawbacks thereof. Specifically, in systems which modulate x-ray intensity by modulating x-ray tube current, "the cooling time of the filament in the x-ray tube limits the modulation response resulting in increased patient exposure to x-rays. Additionally, the x-ray tube requires a minimum current in order to operate." Application, pg. 2, lns. 14-17. As a result, tube current modulation offers a slower response time than does voltage modulation. It follows that voltage modulation can reduce radiation dosages since the intensity of projected x-rays is lowered to a secondary value more quickly. Another advantage to voltage modulation over tube current modulation is the different spectrums produced by different tube voltages, which can aid in distinguishing between materials. Thus, Becker et al., as regarding x-ray tube current modulation, clearly does not teach that which is claimed and presents exactly the type of system that the present invention is intended to supplant.

Similarly, claims 7, 15, 22, and 24 all call for modulation of x-ray tube voltage rather than tube current. Therefore, in at least this regard Becker et al. does not teach each and every element of any of the independent claims of the present invention.

Furthermore, claim 7, as amended, calls for the energizing of "the high frequency electromagnetic energy projection source to a second voltage different from the first voltage during the secondary data acquisition stage to acquire secondary imaging data." Nowhere in Becker et al. is data acquisition in the secondary stage taught. Col. 5, lns. 26-30, 45-47, and 51-54. In fact, Becker et al. is clear that data acquisition occurs only during the RI or DI intervals. *Id.* As shown in Figs. 3 and 4, the reconstruction/data interval never coincides with the lowered x-ray intensities during time Dp. Additionally, claim 7 relates that an image is reconstructed from data of each of the primary and secondary acquisition stages. Becker et al.,

however, teaches that images are reconstructed from data acquired during the reconstruction/data (i.e. higher x-ray intensity) intervals only. Col. 3, lns. 10-15.

Likewise, claim 22 calls for data acquisition during the secondary acquisition stage in reciting the step of "returning the x-ray source to the default, non-zero voltage during CT data acquisition for the secondary acquisition period." (Emphasis added). As argued above, Becker et al. does not teach data acquisition during a time interval of lowered x-ray intensity.

While Applicant believes that those claims depending from claim 15 are in condition for allowance pursuant to the chain of dependency, Applicant also believes that further distinction between the claimed invention and the art of record is illuminated in the dependent claims. For example, Becker et al. does not teach that which is called for in dependent claim 20. Claim 20 calls for the first voltage modulation signal of claim 15 to be determined by the computer "from a set of imaging parameters on a per imaging session basis." The Examiner stated that such was shown in Fig. 3 of Becker et al., and added that "the x-ray current [of Becker et al.] is controlled per each imaging section of the R-R interval." In addition to the fact that Becker et al. does not teach a "voltage modulation signal" in satisfaction of claim 15, Becker et al. also does not teach that the value of any modulation signal is determined from a set of imaging parameters. Becker et al. is simply silent on how a value for the tube current I_o is determined. Furthermore, the x-ray current "control" that the Examiner recited is the control of the interval timing between the tube current levels. This is not a determination of the actual values of the modulation signals, but rather a determination of the timing between undetermined high and low levels of an x-ray modulation signal. Finally, although the proffered explanation does not regard voltage or the determination of actual modulation signal values, the Examiner has expressly acknowledged that the interval timing of Becker et al. is determined "per each imaging section of the R-R interval," which clearly is not a per imaging session basis. Thus, Becker et al. falls drastically short of teaching that called for in claim 20.

In summary, Applicant believes that claims 1, 7, 15, 22, and 24 are patentably distinct from the art of record since, at a minimum, Becker et al. does not teach voltage modulation. Furthermore, Becker et al. does not teach additional elements of claims 7 and 22 in regard to data acquisition in a secondary acquisition stage, and does not teach any of the elements of dependent claim 20. Thus, Applicant believes that claims 1, 7, 15, 22, 24, and the claims that depend therefrom are in condition for allowance.

In light of at least the foregoing, Applicant respectfully believes that the present application is in condition for allowance, and requests timely issuance of a Notice of Allowance for claims 1-2, 4-8, 12-16, and 19-26.

Applicant appreciates the Examiner's consideration of these Amendments and Remarks and cordially invites the Examiner to call the undersigned, should the Examiner consider any matters unresolved.

Respectfully submitted,

J. Mark Wilkinson
Registration No. 48,865
Direct Dial 262.376.5016
jmw@zpspatents.com

Dated: August 30, 2004
Attorney Docket No.: GEMS8081.117

P.O. ADDRESS:
Ziolkowski Patent Solutions Group, LLC
14135 North Cedarburg Road
Mequon, WI 53097-1416
262-376-5170